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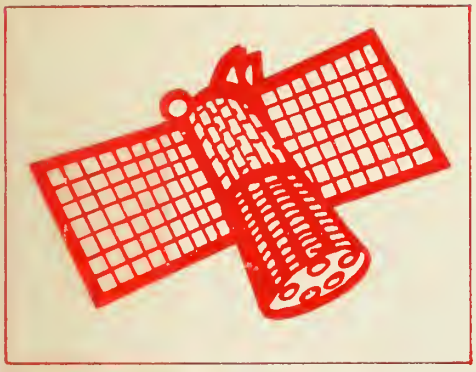
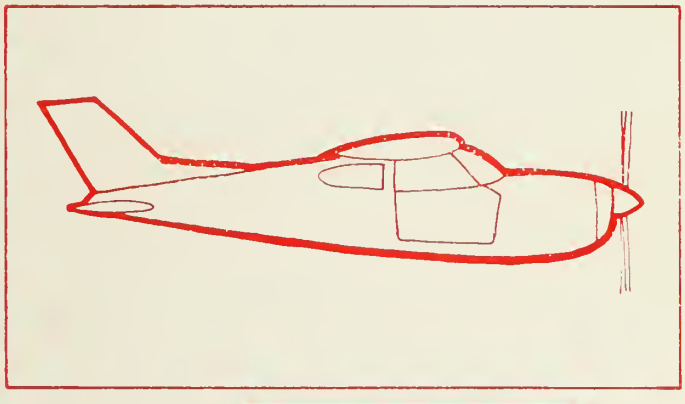
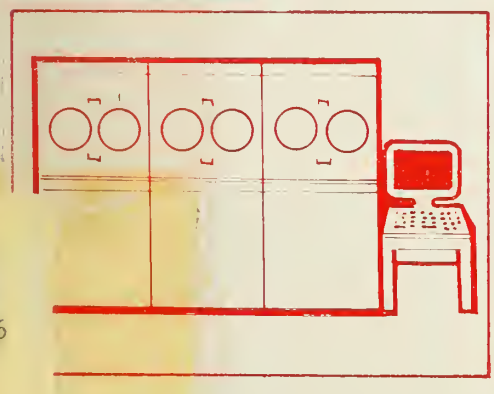


STRATEGIC PLAN FOR INFORMATION SYSTEMS MANAGEMENT





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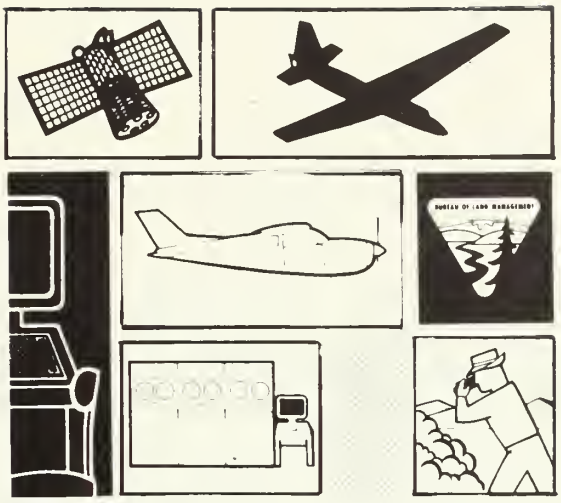

STRATEGIC PLAN

for

INFORMATION SYSTEMS MANAGEMENT

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BLM Information Systems Steering Committee

PREFACE

Ever since taking on the responsibility of directing the Bureau of Land Management, I have been concerned about our ability to collect, assimilate and use the vast amounts of information required in making decisions in this day of rising public interest in the National Resource Lands.

Because of this concern, I asked that a study be made of BLM's information needs and deficiencies, and that a plan be drawn up which could guide the bureau for many years into the future in managing our information systems - both manual and automated. In addition, I asked the team to look into the rapidly improving remote sensing technology to determine how it could aid us in our data gathering efforts.

This document is the result of these studies. It summarizes an indepth analysis and many volumes of highly technical detail. Naturally, much of that detail is lost to generalizations.

I commend it to your reading and understanding so that you may keep in mind where we are going during the implementation period.

Curt Berklund

Curt Berklund, Director
Bureau of Land Management
U.S. Department of the Interior

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CHAPTER I

INTRODUCTION

This plan was developed by the Information Systems Steering Committee. It is based upon the Strategic Plan Study materials prepared under contract by the IBM Corporation and its counterpart BLM team during the period of June 1974 to April 1975.1/ The voluminous technical detail developed by the study will not be published for general circulation, but is available for use by those responsible for implementing the plan.

The Steering Committee and their staff found it difficult, in preparing this plan, to determine the proper level of detail to be used. They recognized the need for enough detailed information on which to base the major system development decisions involved. On the other hand, they strove for brevity, without being superficial. It is hoped that the following is in the correct degree of detail for general understanding of the eventual system.

The IBM/BLM team went through a systematic process (outlined in Fig. 1) in developing the basis for a BLM Strategic Plan. This document builds on that foundation and attempts to lay out the plan in terms of the Steering Committee's perspective.

WHY A STRATEGIC PLAN

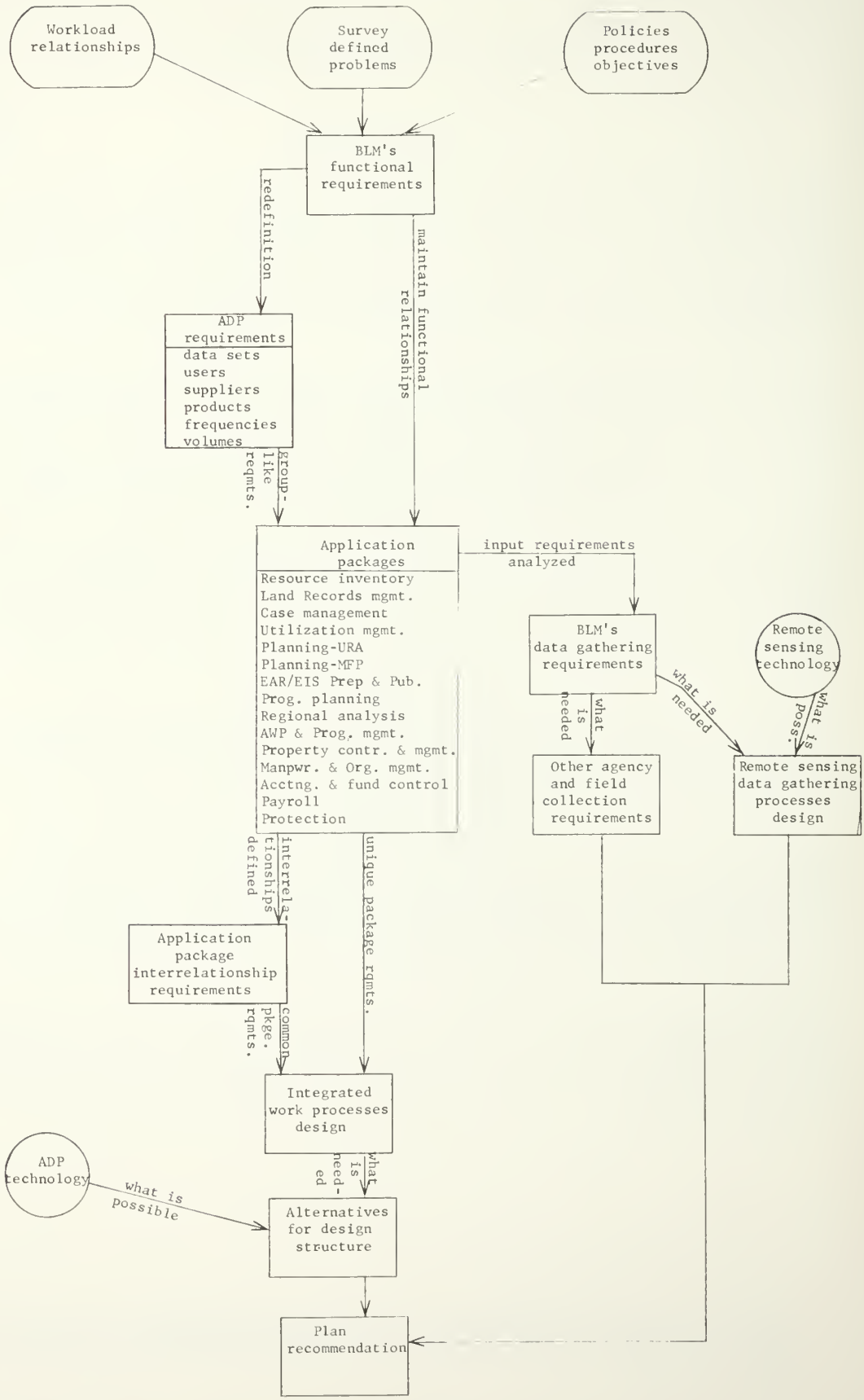
In considering past trends, and how they might extend into the future, it is clear that BLM is spending an increasing number of dollars and man months in the handling of information of all sorts.

In view of the need to collect and handle increasing quantities of information, BLM has initiated a variety of efforts toward information system automation and use of remote sensing. These efforts have not been guided by any overall strategy or plan. This approach holds potential for overlap, inefficiencies, and major gaps in effective information management.

This Strategic Plan is designed to guide BLM into a comprehensive and integrated information system. Also, it provides a basis for more informed decisions about (1) the satisfaction of information system requirements, (2) the management of data, (3) the use of remote sensing technology, and (4) the acquisition of information system hardware and software.

1/ Strategic Plan for Information Systems Management, an information and data management study prepared for BLM by the Strategic Plan Study Team (IBM and BLM).

FIGURE 1. STRATEGIC PLAN DEVELOPMENT FLOW CHART



STRATEGIC PLAN GOALS

1. Provide the Bureau with integrated information systems.

   a. Each data element will be gathered once, be stored in one place, and be available to all users.

   b. Will integrate manual as well as automated systems.

2. Use a building block approach; i.e., satisfy the needs of the field users and, in most cases, the needs of middle and headquarters levels will be met by aggregation.

3. Make information more timely, more readily available, and more useable by reducing the difficulties of manual manipulation and by standardization.

4. Reduce the amount of space required to store records. Reduce the possibilities of lost records.

5. Raise the accuracy level of data, particularly statistics.

6. Through the use of remote sensing and computers, reduce greatly the man-hours required to gather, interpret, and store surface resource information. Reduce man-hours required to track vegetative trends and check on land uses (authorized and unauthorized).

7. Systems will be user oriented rather than machine oriented.

When fully implemented, the goals will be met through improved manual systems as well as the production of a number of ADP and remote sensing capabilities. These capabilities include, but are not limited to:

1. A series of data banks to replace many of the present voluminous files.

2. Access to data and capabilities by all offices.

3. Remote entry, update, and retrieval of information.

4. Call up textual, numerical, and graphic material in the format desired by the user.

5. Overlay information; i.e., resource data on ownership grid, two or more URA overlays, etc.

6. Identification of conflicts (MFP).

7. Modeling and forecasting.

8. Word processing. Assists in preparation, editing, and publishing of EIS's, etc.

9. Track progress and produce end-of-year and other periodic reports by automation.

10. Perform special tasks such as road design, complicated calculations, etc.

11. Abstract, store, and retrieve textual material on research or other information.

OBJECTIVES AND USE OF THIS PLAN

The objectives of this plan are:

(1) Provide a summary of the detailed Strategic Plan Study and recommendations with additional input from the Steering Committee.

(2) Provide a decision document for the Steering Committee and the Directorate.

(3) Provide guidance to the Strategic Plan Staff in their task of implementing the plan.

The plan will be used to guide the efforts of the implementation staff and will be used to inform all Bureau people on the whys and wherefores of the eventual system. It will also be an information document for those outside of the Bureau who might have an interest in what we are doing.

To meet these objectives the Strategic Plan contains three major components - (1) Required Structure, (2) An Implementation Strategy, and (3) An Implementation Schedule.

Required Structure

This component is an outline of the basic concept, major characteristics and framework of the Bureau's plan. As such, it provides an overall guide no matter what strategy and time frame is used to accomplish implementation. This component is described in some detail in Chapter II.

Fifteen "Application Packages" are established in the structure. These are discrete and internally similar portions of the Bureau's total operation which should be sequentially analyzed and possibly make use of automated and remote sensing technology. As such, these are the "bite sized pieces" which can be used to make the entire conversion manageable. Next, the structure includes an outline of specific ADP and remote sensing capabilities and supporting equipment needed to automate the application packages.

ADP capabilities are specific automated processes that the Bureau's system must contain to support the application packages. The capabilities required prescribe the hardware needed. The structure includes an outline of the remote sensing applications and technologies that are required and should be used to maximize efficiency of collecting and updating data, and disseminating information.

An Implementation Strategy

This is an outline of the approach for implementing the structure. This strategy is described in some detail in Chapter III. The implementation strategy includes (1) an analysis of the alternative ways to obtain use of the required ADP and remote sensing capabilities, (2) an analysis of alternative organizational arrangements to staff and guide the implementation effort, (3) a policy for integration of existing automated information systems into the Strategic Plan, (4) the necessary sequential steps or phases which should be followed by the Bureau to efficiently implement the automation and remote sensing technology outlined in the Strategic Plan, and (5) a sequential priority to follow in the analysis and implementation of application packages.

MANAGEMENT CONSIDERATIONS IN ADOPTING THE STRATEGIC PLAN

Benefits

The Strategic Plan will meet the Bureau need for better systems and information management. The plan will maximize automation, and otherwise improve, the Bureau's handling of information. It will make data and information available through a concerted effort to combine existing data sources and storage media. Given the enormous volume of data and information about lands and relations of and with users, the plan will provide quick and effective retrieval to decision makers. In addition, it will assist the Bureau in analyzing and comparing data, from past trends to present, for similar or unlike areas or functions, and for costs and inputs and outputs. Finally, the plan provides an opportunity to assimilate information from other sources - data, bibliographic references, etc., - thus expanding the capacity of BLM decisionmakers.

Risks

The value of improved information, and the importance of better information to the Bureau, should not blind one to the difficulties and risks inherent in the change process. Many agencies and private companies have found the change process can be quite painful.

The potential for improvement in the quality of BLM decisions and actions, and the potential for gain in total effectiveness convinced the Bureau that it should accept these risks realistically and proceed with the project and program.

IMPACT OF THE STRATEGIC PLAN

The basic impact of the adoption of the plan is to accelerate the already pronounced trend of the Bureau toward becoming an information based agency. A whole series of forces have pushed BLM away from its old image of doing only routine work out on the public lands toward a considerably more

sophisticated management and coordination of resources role. Better management of information systems will aid the Bureau in coping effectively with its responsibilities.

A second set of impacts has to do with the ways of staffing, training and managing in the Bureau. By relying more on information and data systems, BLM will become increasingly dependent upon the systems' "perception" of the world.

Constant effort will ensure accommodation of changes and adjustments in the environment of BLM. A significant number of employees at the professional level will be trained over the next few years to fully understand, develop and use the data and information systems. Many employees - clerical and professional - will be trained in the use of specific applications at the detail level.

CHAPTER II

THE REQUIRED STRUCTURE

Introduction

As outlined in the preceding introduction, the required structure is an outline and description of the major characteristics and framework proposed for the Bureau's use of automated information handling and data acquisition by remote sensing technology.

The structure is subdivided into three major sections:

- Application packages to be used
- ADP capabilities required
- Remote sensing capabilities required

This structure will provide an effective framework or overall guide for coordinating either the recommended major conversion program or the existing ad hoc efforts toward improved automated data handling and remote sensing processes.

Application Packages

Before discussing the rationale for the prescribed application packages, two terms should be clarified.

- A BLM function (sometimes called "program activity") refers to a body of authority, objectives, procedures, data, skilled staff and general manpower operating together to achieve some desired mission. These functions include Lands, Range, Forestry, Watershed, Wildlife, Recreation, Minerals, Cadastral Survey, Fire Protection, Roads and Trails, Access Transportation and Rights-of-way, Personnel, Property Management, Program Planning and Management.
- An application package is a combination of similar work processes 1/ used to support one or more of the above functions. The fifteen application packages taken together include all the work processes needed to support all the above functions.

1/ A "Work Process" is a specific task, such as making an appraisal or collecting a specific kind of inventory data.

Three study team precepts provided guidelines for application package definition:

- An implemented application package will improve the manner in which a job under BLM responsibility is currently being performed.

- A package will fully or partially satisfy BLM functional or program activity requirements, as they now exist, or were projected to exist by the program manager. The study team assumed no changes in the Bureau's basic program or functional alignment.

- An application package should be defined so that it can be developed and implemented independently even though full utility may not be realized until several packages are implemented.

Description of Application Packages

Division of the Bureau workload into manageable groups for purposes of analysis and implementation resulted in the following fifteen application packages. An application package code is in parentheses after each package title.

Phase I

- Resource Inventory (RES)

The Resource Inventory package includes the processes of data gathering, storage, analysis, maintenance and statistical, graphic and narrative retrieval for all Bureau managed resources.

- Planning-Unit Resource Analysis (URA)

The URA package includes processes of compiling, maintaining, evaluating, and revising URAs including data collection, summarization, analysis of resource potential, preparation of narratives, tables, maps and overlays.

Phase II

- Land Records Management (LR)

The Land Records package includes the processes of data gathering, storage, analysis, maintenance, and statistical, narrative and graphic retrieval of master title, survey and supplemental plats, field notes and associated historical indices.

- Case Management (CM)

The Case Management package includes the processes of receiving, accounting, recording, docketing, appraising and tracking all case types done in the Bureau. This package will support requirements for data gathering, storage, update; and statistical, narrative and graphic retrieval of case information.

- Utilization Management (UM)

The Utilization Management package includes the processes of data gathering, storage, analysis, maintenance, statistical and graphic retrieval for compliance checks, contract administration, trespass, billing, reports and record keeping functions.

Phase III

- Planning-Management Framework Plan (MFP)

The MFP package includes the processes of compiling, maintaining, evaluating and revising Management Framework Plans, including analysis of URA data, resummarization, preparation and maintenance of narratives, tables, maps, and overlays.

- Program Planning (PP)

The Program Planning package includes the processes of developing, maintaining, evaluating and revising all Bureau program plans, specific project plans and associated studies. The package includes analysis of URA and MFP data, additional data gathering and storage requirements, resummarization and preparation of narratives, maps and overlays.

- Regional Analysis (RA)

The Regional Analysis package includes the processes of analyzing the significance of resource values in place to the market or other clientele they serve. This includes capability to relate resource values in specific areas, and in various levels of aggregation, to the using publics, industries, and economies, in a variety of impacted or related regions. The package includes the processes of data gathering, storage, analysis and manipulation, maintenance and production of tables, narratives, maps, and overlays, and reports.

- EAR/EIS Preparation and Publication (EIS)

The EAR/EIS Preparation and Publication package includes the processes of developing and compiling of environmental impact statements, environmental analysis records or any other environmental analysis or report required prior to a BLM action or project which results in documentation.

Phase IV

- Annual Work Planning and Program Management (AWP)

The Annual Work Planning and Program Management package includes the processes of data gathering, storage, analysis, maintenance and production of tables and narratives as necessary to support preparation and maintenance of advices, directives, AWPs, operating budget, progress reporting, program monitoring and functional evaluations.

- Accounting and Fund Control (AFC)

The Accounting and Fund Control package includes the processes of receiving, accounting and disbursement of Bureau funds, expenses and revenues. This package includes financial management in the areas of data recordation, storage, maintenance, summarizations and production of tables and reports to meet various requirements.

- Payroll (PAY)

The Payroll package includes the processes of data recordation, storage, maintenance, analysis and production of paycheck data, payroll tables and required reports.

- Manpower and Organization Management (MOM)

The Manpower and Organization Management package includes the processes of manpower planning and utilization and personnel records management in terms of data recordation, storage, summarizations, analysis and production of tables and required reports.

- Property Control and Management (PCM)

The Property Control and Management package includes the processes of acquiring, maintaining and accounting for Bureau property including structures, facilities, communication systems, equipment, supplies and tools; issuance and movement of tools and equipment. The package includes processes of data recordation, storage, maintenance, summarizations and production of tables and required reports.

- Protection (PRO)

The Protection package includes the processes of fire management and fire operations in the Bureau in terms of data gathering, recordation, storage, maintenance, analysis and production of tables, maps, and overlays.

These application packages allow the Bureau a different way of organizing data and information to meet its needs. Currently ADP systems are developed in response to various specific problems which result in duplication of data and effort and inability of one system to easily share data with another system. The Bureau will have the means, through the Strategic Plan, to develop systems that will support problem solving on a unified basis. For example, the Bureau currently has at least four separate systems to support and track various utilization management processes. These include range utilization, material sales, coal leases and other-than-coal leases. The information available from each is not easily combined for any utilization management statistics or summary reports. Development and implementation of one Utilization Management package, which considers all land use information and process needs, will bring these "bits and pieces" together.

Application Package Interrelationships

The data relationships of one application package to others is an important aspect in the development of an integrated information system for the Bureau. The relationships among packages clearly display two facts verified during the Strategic Plan study effort:

- An integrated BLM information system has a large number of application interrelationships.

- Removing an application from the system also removes and weakens the integrated nature of the system and benefits which are realized from that integration.

The nature of the package interrelationships varies. In some cases the interrelationship is mandatory, i.e., the Resource Inventory/URA relationship. To provide a comprehensive URA, access to resource inventory data is a prerequisite. In preparing a URA, frequent references to resource data are required. The problems identified during the Strategic Plan study place much emphasis on the need for faster access to more accurate inventory data. Implementation of the Resource Inventory application would thus be the first step in providing faster access and the tool to support more accurate, up-to-date URAs.

A mandatory automated relationship is determined when the necessary support of one package for another cannot be effectively accomplished manually. Factors considered in determining a mandatory relationship were:

- Frequency the interrelationship is needed.

- Volume of data passing between the two applications.

- Number and geographic proximity of the application area users.

- Current Bureau policy as to the similar organizational responsibility of the two applications (both are State-level functions or both are District-level functions).

- The extent to which current procedures satisfy application interrelationship requirements.

- The dynamic/stable nature of the data which passes between the two applications. Does the data change too fast to permit manual support?

- Geographic dispersion of data sources.

If two application packages have a relationship but it is not strong according to the above factors, the relationship is considered optional - nice to have. The mandatory/optional decisions recorded in the following Applications Interrelationships Chart reflect:

- Study team interpretation of the data and process needs identified during this study.

- Experience of study team members and contacts made during this study. (Personal experiences of other Bureau personnel may result in different opinions as to the mandatory or optional nature of an interrelationship. Ironing out these differences is one of the objectives of the Detailed Requirement Definition described in Chapter III., Necessary System Implementation Steps.)

Reading down a column, you will find the application packages which are mandatorily or optionally required to adequately perform the application in the column header. Reading across a row, you will find the application packages which are mandatorily or optionally supported by the application in the row stub.

REQUIRED ADP CAPABILITIES

ADP capabilities are the kinds of data processing tools needed to support the processes in the application packages. Ten ADP capabilities have been identified as necessary to support the fifteen application packages:

(1) Structured data handling-update.

(2) Structured data handling-retrieval and output.

(3) Mapping and graphics-update.

(4) Mapping and graphics-retrieval and output.

(5) Text processing-update.

(6) Text processing-retrieval and output.

(7) Text processing-composition.

(8) Special processes.

(9) Computer assisted training.

(10) Data base-data management.

When developing any one of these ADP capabilities, all of the application packages affected must be considered. This provides the necessary information to design the maximum amount of comprehensiveness into each capability. In this way, the ADP capability can be designed and used to support multiple work efforts. For example, if structured data handling-update capability is developed initially for use by the Resource Inventory Application Package, when the Case Management Application Package is implemented, the capability would be available for its use.

Figure 2: Application Interrelationships

APPLICATIONS SUPPORTED

APPLICATIONS REQUIRED	Resource Inventory	URA	MFP	Program Plans	AWP	Accounting and Fund Control	Payroll	Land Records	Case	Utilization	Manpower & Organization	Property	Protection	Regional Analysis	EAR/EIS
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Resource Inventory		M			M				M				M	O	M
2. Planning - URA			M	O									O		
3. Planning - MFP				M					O				O		O
4. Program Planning		O			O	M					M		O		O
5. AWP and Program Mgmt.				M		O						O	O		
6. Finance: Accounting and Fund Control				M	M				M	M	M	O	M		
7. Finance - Payroll						M					M		M		
8. Lands Records Mgmt.	O	O	O						O						O
9. Case Mgmt.		O	M			O		M		M					O
10. Utilization Mgmt.			M	M		M		O					O	O	O
11. Manpower and Organization Mgmt.				M	O								M		
12. Property Control and Mgmt.		O	O		O	O							M		
13. Protection			O			M									O
14. Regional Analysis		M	M	M					M						M
15. EAR/EIS Preparation and Publication			O						O						

M= The relationship between the two application packages is mandatory.

O= The relationship between the two application packages is optional.

By developing an ADP capability in this way, the initial effort may be increased, but the subsequent benefits are significant in avoiding repeated development efforts. When other packages are implemented the ADP capabilities needed will already exist, requiring only the appropriate development of specific application programs. The savings in development time and rapidity of implementation are the anticipated benefits of this approach.

There follows a brief definition of each of the ten ADP capabilities and how they may support application packages and improve Bureau operations.

1. Structured Data Handling - Update.

This capability allows "files" of information and data to be established with the ability to keep the files accurate and current by accepting change information.

2. Structured Data Handling - Retrieval and Output.

This capability allows the user to search through all the data stored in the computer until the desired data is found and extracted. The extracted data is then displayed in user defined or standard format. The display can be on a terminal screen and/or hard copy (paper).

3. Mapping and Graphics - Update.

This capability allows storage of map data and the addition, change or deletion actions to that map data by authorized personnel. This capability is similar to the structured data handling capability except for technical considerations. Graphic updates of lines, points and polygons use a different technology than updates involving letters and numbers.

4. Mapping and Graphics - Retrieval and Output.

This capability allows the user to search through all the map data stored in a computer until the desired geographic and attribute data is found and extracted. The data is then displayed graphically at a user defined scale. The display can be on a terminal screen and/or hard copy (paper or mylar).

5. Text Processing - Update.

This capability allows initial storage of textual information from abstracts, periodicals, books, research documentation, etc., and changes to that textual data by authorized personnel.

6. Text Processing - Retrieval and Output.

This capability allows the user to search through all or part of the stored textual data using keyword(s) or subject matter parameters until the desired text is found and extracted. The extracted data is displayed in a predefined, standard format (indentation, spacing, margins) established during the development of this capability.

7. Text Processing - Composition.

This capability provides a full English language composition facility with page formatting, page headings, footings, page numbering and margin justification. The ability to copy, move, erase and add text (from a single character to a whole document) is part of this capability.

8. Special Processes.

This category is a catch-all for those many capabilities which allow analysis of complex situations, trend predicting, forecasting, simulation and modeling. (Efficient use of this capability assumes that structured data handling - retrieval and output - is operational.) Examples of the kinds of processes supported by this capability are:

- polynomial manipulation
- matrix manipulation
- time series analyses
- variance analysis
- interpolation
- simulation

9. Computer Assisted Training.

This capability provides a tutorial approach of instructing the user through each step of an ADP supported Bureau function. No special control language or formal programming experience is required of the user.

10. Data Base and Data Management.

This capability provides the means of storing data in such a way that it can be related to other data to form meaningful information.

It is required that each capability be available to the user at the user's site (District Office, OCS or State Office, WO, etc.) and that each user is connected directly or indirectly to a central computer via telecommunications capability.

Telecommunications is the process of transmitting data over long-distance communications facilities such as telephone lines or communications satellite. Telecommunication is the hook-up to connect the ADP capabilities to the users. Data is passed from the data banks in a computer to and through telecommunication devices connected together to form a network. In the network, the telecommunication devices are usually terminals that allow personnel working at them to interact directly with the computer.

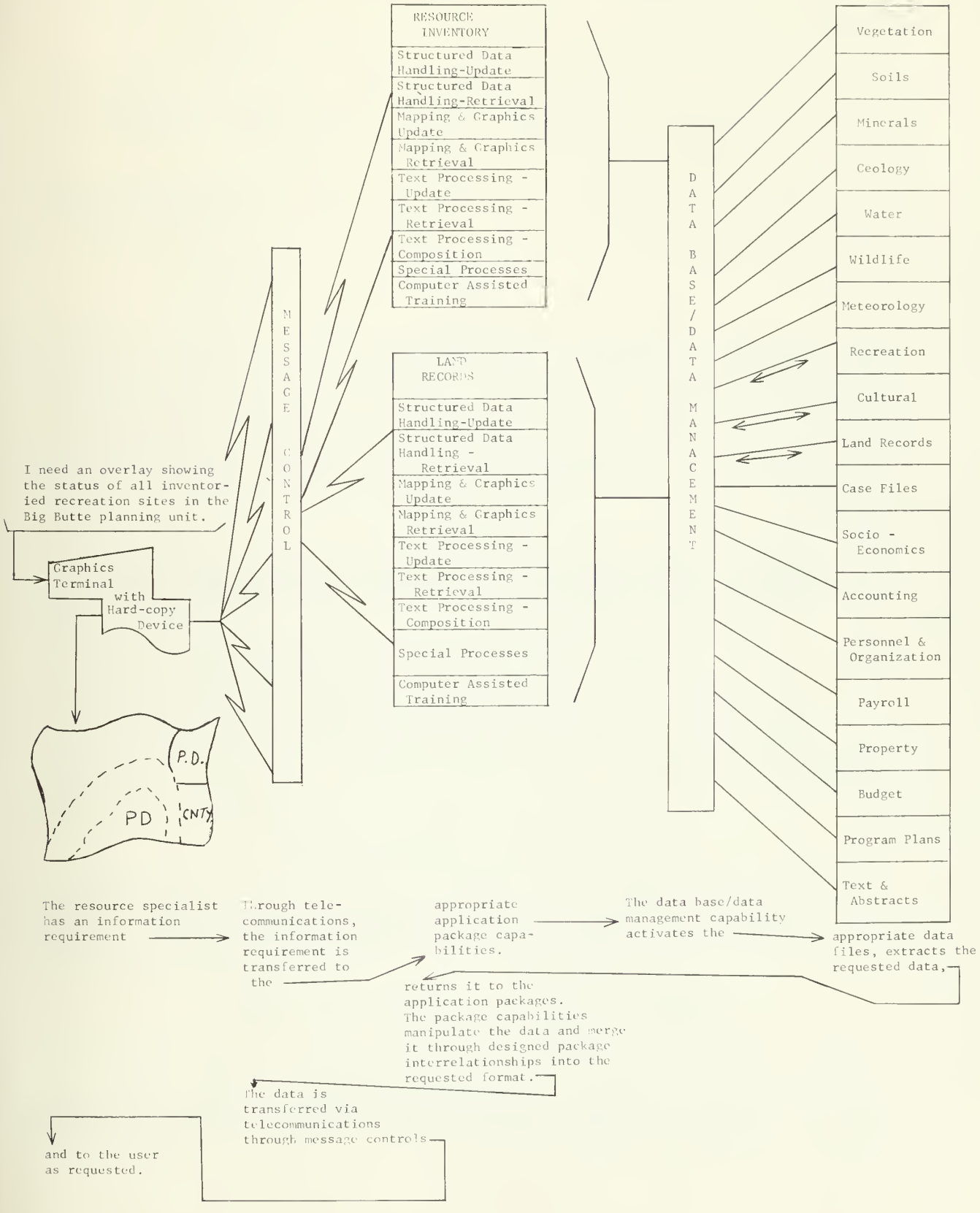
A terminal may be one of a variety of devices such as a keyboard (with or without a display), a printer, another computer, or a graphics tablet.

Figure 3 - RELATIONSHIP OF ADP CAPABILITIES TO THE APPLICATION PACKAGES

ADP CAPABILITIES \ APPLICATION PACKAGES	Resource Inventory	Land Records	Case Management	Utilization Management	Planning - URA	Planning - MFP	EAR/EIS Preparation and Publication	Program Planning	Regional Analysis	AWP & Program Management	Property Control and Management	Manpower & Organization Management	Accounting and Fund Control	Payroll	Protection
Structured Data Handling - Update	●	●	●	●	●	●		●	●	●	●	●	●	●	●
Structured Data Handling Retrieval and Output	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Mapping and Graphics - Update	●	●	●		●	●		●	●						●
Mapping and Graphics - Retrieval and Output	●	●	●	●	●	●	●	●	●						●
Text Processing - Update		●			●	●	●	●				●			●
Text Processing - Retrieval and Output			●		●	●	●	●		●					●
Text Processing - Composition	●	●			●	●	●	●							
Special Processes			●	●		●	●	●	●	●	●	●	●	●	●
Computer Assisted Training	●	●	●	●	●	●		●	●	●	●	●	●	●	●
Data Base - Data Management	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

● Indicates that the ADP capability is required to fully support the application package.

Figure 4 - THE RELATIONSHIP OF APPLICATION PACKAGES TO ADP CAPABILITIES - DATA FILES AND TELECOMMUNICATIONS



REQUIRED REMOTE SENSING CAPABILITIES

Remote sensing is the art or science of making measurements of phenomena by use of sensors at positions remote from the object observed.

Basically, there are two types of remote sensing - one passive, the other active, and both measure some portion of the electromagnetic spectrum. The sensors may vary, but a platform (aircraft, spacecraft, cherry picker, ladder, etc.) can carry both active and passive sensors.

The sensors collect various kinds of data about the phenomena they observe. This data requires some form of interpretation before it becomes useful to the resource manager.

Sensors

Sensing equipment has changed dramatically in the past few years. While aerial photographic systems continue to be the "work horse" in remote sensing in the Bureau, multispectral scanners, radar, and radiometers show great potential for providing other forms of information not available in aerial camera systems. The resource specialist should be trained to match the technology with the information requirements, sensor to job. Remote sensing capabilities required to support the application packages include the following:

- Camera systems measure the visible portion of the electromagnetic spectrum only. With the use of filters and multilens cameras, multispectral images can be obtained, and continuous strip images can be exposed by the use of special cameras. The scale and resolution vary with the focal length of the camera and the height above the ground. Photography, the product of the system, has a very rigid mathematical solution when it is used to obtain measurements. Most aerial photography has been obtained in black and white, although natural color and color infrared are being used in many formats today.

  Use of this capability will improve Bureau operations in the following areas:

  - ° inventory of forest stands
  - ° mapping of range and wildlife forage types
  - ° mapping of soil types
  - ° mapping of watersheds
  - ° mapping of land use (in place)
  - ° provide a base for engineering projects - roads, utility lines, recreation sites, dam sites.

- Multispectral scanning systems open the electromagnetic spectrum from ultra violet into the far infrared. Through a single lens system the amount of energy reflected by a resource can be split into several regions of the spectrum. By filtering techniques, specific types of sensors, and cooling systems, the energy is recorded electronically for as many as twenty-four levels. The results when compared to ground measurements can identify specific elements which give meaningful information to the manager.

  Application of this capability will support the following operations in the Bureau:

  - ° to quantify the various elements of the resource inventory by comparing several bands
  - ° detecting pollution in streams and on lands
  - ° detecting insect infestations
  - ° measurement of snow pack
  - ° use in detection of fire "hot spots"
  - ° location of archeological sites

- Radar can be used to make measurements that are not weather dependent. Application of this capability will support the following operations:

  - ° geological formations for mineral locations
  - ° possible location of ground water

Aircraft and satellites are the platforms that carry the various sensors whether they are cameras, multispectral scanners, radar or other types of sensors.

Applications System Verification Test

An "Applications System Verification Test" in conjunction with NASA is planned. The test will produce an operational system for analyzing remotely sensed data. The latest techniques will be used throughout. This includes the gathering of data as well as its analysis.

Analytical Capabilities for Remote Sensing

Basically, aerial photography will be used for interpretive work. Where applicable, computer compatible tapes from satellite or aircraft sensors will be analyzed by automatic data processing equipment. The analytical processes will have programs to include corrections for spectral, spatial, and temporal data; overlay one scene upon another, or superimpose map data

over the scene; and print out differences or single thematic information. The major features of the system is the interactive capability between the resource manager and the equipment.

Application of this capability will provide an analysis of the scene to detect:

- land use
- hydrological analysis
- vegetative trends and conditions
- soil classification
- geologic formations
- environmental quality and impact
- coastal zone resources
- ice movement
- snow pack
- strip mine monitoring
- timber cutting

Ground Data Collection Systems

Data collection systems provide a means of collecting information from remotely located instruments (rain gauges, thermometers, stream gauges, snow pillows, anemometers, water quality stations) and telemetering this information via the satellite, to a ground tracking station to a computer, and finally to the user who puts the information into some management practice.

Application of this capability will improve or assist Bureau operations in the following ways:

- data collection stations (i.e., field weather stations) can be automated
- reduce the radio traffic on the BLM network through which the weather data is now fed into a central office
- locate needed stations in remote areas to gather data.

There are nine recommended capabilities for the analysis of remotely sensed data. The relationship between various analytical capabilities and the application packages is shown in Figure 5.

1. Interactive: A process of using ADP equipment where a person may interact with the machine to assure correct results.

2. Full Color Display: A color television capability upon which the various grey levels of imagery can be displayed as colors.

3. Printing/Plotting: A capability to produce hard copy maps or photographic prints when driven by a computer.

4. Camera Imagery: A photograph in black and white, color or color infrared.

5. Multispectral Imagery: A capability to generate photographs from computer compatible tapes in any portion of the spectrum. May be viewed on a cathode ray tube.

6. Radar Imagery: A capability to generate photographs from a computer compatible tape produced from radar equipment. May be viewed on a cathode ray tube.

7. Radiometric Corrections: Factors applied to computer interpretive techniques which correct the scene for the amount of energy being reflected by the phenomena being viewed.

8. Geometric Corrections: Factors applied to an image to correct it for geometric position.

9. Overlay: The ability of the computer to overlay one scene upon another of the same area, or overlay a line map over an image and correct for geodetic positions.

Figure 5 - RELATIONSHIP BETWEEN APPLICATION PACKAGES AND REMOTE SENSING CAPABILITIES.

APPLICATION PACKAGES / REMOTE SENSING SYSTEM CAPABILITIES	Resource Inventory	Land Records	Case Management	Utilization Management	Planning - URA	Planning - MFP	EAR/EIS Preparation and Publication	Program Planning	Regional Analysis	AWP and Program Management	Property Control and Management	Manpower & Organization Management	Accounting and Fund Control	Payroll	Protection
Interactive	●			●	●	●	●	●	●						●
Full Color Display	●			●	●	●	●	●	●						●
Printer/Plotter	●			●	●	●	●	●	●						●
Camera Imagery	●			●	●	●	●	●	●						●
Multispectral Imagery	●			●	●	●	●	●	●						●
Radar Imagery	●			●	●	●	●	●	●						●
Radiometric Correction	●			●	●	●	●	●	●						●
Geodetic Correction	●			●	●	●	●	●	●						●
Overlay	●	●		●	●	●	●	●	●						●

CHAPTER III

STRATEGY FOR IMPLEMENTATION

INTRODUCTION

The strategy in this chapter is the approach for implementing the structure described in Chapter II. This strategy includes:

- An analysis of the way to obtain the required ADP and remote sensing capabilities, along with the planned approach and list of specific equipment items needed.

- An analysis of organizational arrangements available to staff and guide the implementation effort.

- A policy for use of existing automated systems.

- The necessary sequential steps or phases which should be followed to efficiently convert to the use of automation and remote sensing technology outlined in the chapter on Required Structure, and a more detailed list of design and implementation activities required.

- A sequential priority to be followed in analyzing and implementing application packages.

This Implementation Strategy, along with the Structure, will provide a comprehensive statement of policy and a specific strategy which will guide Bureau staff in the design and execution of the various implementation tasks.

EQUIPMENT APPROACH

Approach for ADP Equipment

This part is directed initially at equipment alternatives to meet the ADP capability requirements discussed in Chapter II. Some of the equipment would also support the remote sensing capability requirements discussed in Chapter II. The discussion at the end of this section indicates what is now known about additonal equipment needed to fully support remote sensing.

Several alternatives were considered regarding the appropriate equipment configuration for BLM:

a. A Departmental computer where the Bureau would share in the use of one large computer center operated by DOI.

b. Use of other governmental agencies to do our data processing.

c. A Bureau computer center limited to mission oriented workload using some other ADP facility(s) for administrative functions.

d. A Bureau decentralized configuration where each region or State Office has its own computing separate from a central source.

e. A Bureau configuation where complete support is concentrated at a central facility with Bureau field office computers and/or terminals interconnected through some kind of communications (telephone lines, leased private lines, or satellite).

Discussion of the five alternatives and the advantages and disadvantages of each resulted in the Bureau opting for alternative (e.).

The current Bureau situation in terms of automated information processing is unbalanced. Oregon has reached a high level of sophistication using graphics technology. In cooperation with the state and county governments, Oregon State Office personnel have successfully developed an interactive graphics configuration which provides resource managers with one type (graphics) of information for decision making.

Alaska State Office also has access to its own computing sources. They have developed applications to support intra-state case file and land status information needs.

In both of these cases, the support is not available on a Bureau-wide basis or even to all the BLM personnel in the area. In contrast to Oregon and Alaska, the other 10 states rely almost entirely on the Denver Service Center for automated information processing needs. At this time, the Service Center itself does not have as full a range of data processing capabilities as required.

Just as the current Oregon and Alaska situations are the results of evolutionary growth based on local need, available resources and user acceptance of each phase over time, so must the future Bureau-wide situation be a result of local and national need, available resources and user acceptance of each phase over time.

Two major phases to the integrated, Bureau-wide growth toward a configuration of terminals and computers which will successfully provide on-the-ground line and staff with information for decision making are being pursued.

The first phase regarding equipment configuration is the acquisition of a large computer in the Service Center eventually accessible by all BLM offices that lie within the limits of current telecommunications technology. Each office is to have information processing services as though the computer in Denver were dedicated to that office. A primary goal is to effectively integrate data processing and remote sensing in support of Bureau goals on a Bureau-wide basis. The central computer will be used for:

- Backup function.

- Clearinghouse functions.

- A large amount of data storage.

- Overflow protection.

- Bureau-wide processes that support voluminous data bases, are highly batch oriented and require processing speed which the large computer offers.

Many of the Bureau's information generating processes involve methods that are common to all offices: URA's and MFP's require generation of certain maps and statistical tables. The only difference in these products from one office to another is the data. The Public Domain timber inventory system is applied to each inventory area with only minor, if any, changes from one inventory area to another. The information processing steps are repeated for each area and the district(s) responsible for an inventory area receive reports and listings that are duplicated in format for other districts. In satisfying these kinds of common requirements, several offices can share the same standard automated process. These standard processes will be developed and maintained centrally for use by all field offices.

The second phase of acquiring equipment configuration will provide processing capability to BLM offices as localized need dictates. This will give the user computational power for his unique requirements without affecting the centralized requirements. For example, a percentage of the resource data gathered at a district may not be used anywhere else - even in summarized format. Since no one else needs this data, it is most practical to store it physically in that office. Offices would go about obtaining financial resources for such localized processing capabilities through the AWP process. All localized, unique processing support will be developed to fit within the centralized aspect so that should the localized need become Bureau-wide, the localized support can easily be expanded to a Bureau-wide base.

This second phase has several ADP names - distributed processing, distributed computing, localized processing, down-line processing. Whatever title you choose, it implies the placement of equipment with its own computing power at the field level of BLM to capture and process data at the source.

Centralized processing and localized processing are both necessary for BLM. Certain Bureau functions are more effectively supported centrally while other (local) functions are more effectively supported by a field-level configuration. The determination of which configuration best suits a function will be based on performance - performance of the system must be such that people will use it. If a user needs to manipulate ten million characters of basic resource data on a daily basis, the volume, frequency and limited number of users accessing the data may indicate the need for distributed processing.

Not all offices will be equally involved in the distributed configuration:

- Program priorities and localized crises may dictate acquisition of a small or mini-computer at one office early in the evolution of our total configuration picture.

- Oregon is already into the localized phase of the equipment picture because of their unique need for extensive forest management. Integrating Oregon into the Strategic Plan will emphasize alternatives to better service their needs which are not localized.

- The energy states may be into the localized support phase much sooner than the states without such a critical commodity to sell.

- Alaska will likely remain separate from the Central equipment and communication network until better methods of communication with the lower 48 are available. Alaska will share in the development of the Bureau-wide applications so that if and when it is financially possible to include them in the Bureau network, their systems may be immediately supported.

It is anticipated that the ratio of localized processing to centralized processing will be very low initially. Whether the localized phase grows depends on several factors:

- Information obtained from the Detailed Requirement Definition effort regarding data needs including frequency of users, location of users, volumes, etc.

- The critique of initial localized processing users to the impacts of on-site computing power and of centralized processing users to the impacts of their situation.

- Advances in ADP technology and telecommunications capabilities that are beneficial to BLM.

Alternative Approaches for Obtaining Remote Sensing Capability

Both sensing and analytical capability are needed, as indicated in Chapter II. Several alternatives have been considered, including:

- BLM acquire all the equipment needed to meet both sensing and analytical needs.

- Obtain imagery, processed, analyzed and ready to use, entirely from a contractor or another agency, and acquire only limited special purpose interpretation equipment.

- Mixture of above alternatives.

The first alternative is not favored since this would put BLM in the role of developing its own satellite and aerial photography capability - an area where other agencies and contractors are well established and where it would be much more efficient to purchase their sensing capability.

The second alternative is not favored either since this would not permit BLM to develop its own analytical capability, to analyze imagery to obtain the unique data needed for BLM purposes. This second alternative would greatly reduce the flexibility and responsiveness needed to support the user oriented interactive capability desired.

The third alternative is the one BLM plans to use in implementing this plan. Imagery will be obtained from a contractor or another agency. The Bureau will obtain its own analytical capability.

Using the third alternative will require, in addition to other ADP equipment, some special hardware for analytical work.

IMPLEMENTATION ORGANIZATION

An adequate organization structure and suitable operating guidelines are needed. The planned organization is based on explicit organization and management criteria which attempts to express the Steering Committee's judgement and assumptions about present and future operating conditions and needs. The criteria and the assumptions used in developing the proposed organization are:

Criteria

- The structure and procedures should have the capacity to adjust and accommodate change in an evolutional way since the Strategic Plan is of necessity dynamic.

- The structure and procedures should provide for adequate and balanced participation by users, ADP and Remote Sensing.

- The location and structure of each component of the organization should be such that it ensures close and effective program and policy direction and coordination with the related Bureau activities.

- The structure should provide for a single high level focal point responsible for the project management and implementation of the Strategic Plan.

- The organization, priorities given to staffing it and related activities, and procedures developed to implement the Strategic Plan should, in a timely way, provide for the necessary level and mix of skills to support implementation of the plan.

- The organization should make adequate provision for increased inter-agency coordination and cooperation in areas related to information systems.

- The organization should be designed so that it meshes into normal BLM organizational patterns and functional responsibilities at all levels of the Bureau.

- The organization should be designed so that as the Strategic Plan develops most of the operational effort and emphasis of the core staff can be shifted to subject matter and operational personnel at the Service Center and field office levels.

- The structure should initially be designed to accommodate the use of ad hoc team efforts to accomplish high impact program demands and should not attempt to be totally self contained.

Assumptions

- The Steering Committee concept will continue to be used to provide general guidance to the further development of and implementation of the Strategic Plan.

- Chairmanship of the Steering Committee will continue to be a Directorate level assignment.

- Lead staff responsibility for the project management and program direction to Strategic Plan implementation will be assigned to the Washington Office.

- Operational aspects of Strategic Plan implementation will be assigned to the Service Center or perhaps special segments to specifically designated field offices.

- Input to the Strategic Plan of technical requirements from the Bureau's basic disciplines will come from the Service Center level with proper coordination and clearance from the Washington Office technical staffs.

- The Strategic Plan will give high priority to integration, as soon as possible, of ongoing ADP systems or those in the design and development stages, no matter what their source or present stage of development.

- Some detached and perhaps somewhat independent ADP efforts will continue, for an interim period, outside of specific Strategic Plan efforts, but will generally fall under the overall perview of the plan subject to Steering Committee review and approval.

- The Strategic Plan will receive continuing support from Bureau management in terms of funding, staffing priority and necessary technical support inputs.

- There will be heavy involvement and committment from subject matter specialists at all levels of the Bureau to make adequate input to the development of the Strategic Plan on a continuing basis.

- The development of Remote Sensing capabilities within the Bureau will be directly tied to development and implementation of the Strategic Plan, especially during the initial phases of both.

Organization Decisions

Various organizational alternatives to implement the Strategic Plan were considered, examined and analyzed. Based on this analysis and the conclusions reached, the following decisions regarding an organization structure have been made:

- The Steering Committee has been restructured and includes one representative from each Assistant Director area, at the Division Chief level or higher, plus an executive secretary.

- The Steering Committee chairman is the Assistant Director, Technical Services.

- The vice-chairman is the Deputy Assistant Director, Resources.

- The executive secretary is the program analyst reporting to the Deputy A. D. Technical Services.

- The Steering Committee also functions as the Bureau's ADP executive review board.

- A relatively small organizational unit has been established reporting to the Deputy Assistant Director, Technical Services, with assigned responsibility for implementation of the Strategic Plan.

- This staff is made up of the following kinds of skills deemed necessary to properly manage implementation of the Strategic Plan:

  Project management and systems development skills

  Policy development and inter-agency cooperation skills

  Remote sensing skills

  Automatic data processing skills

- This staff will be identified as having specific responsibility for project management of Strategic Plan implementation and related activities.

- Multi-discipline ad hoc teams have been and will be established at the Denver Service Center as needed to carry out specific segments of the implementation plan. This might involve the establishment of a permanent coordinator and/or team leadership positions at DSC to ensure proper management of this activity.

- An information systems and remote sensing coordinator will be designated in each AD's area to serve as the focal point for Strategic Plan coordination for various disciplines involved, especially with regard to liaison with Service Center and field counterpart staffs.

- The DSC Division of Data Processing has been realigned as necessary to accommodate the new emphasis which will be required under the Strategic Plan development activities.

POLICY FOR INTEGRATING EXISTING ADP SYSTEMS

A part of the strategy for implementing the Strategic Plan includes a careful review of existing systems which may be within the scope of the Strategic Plan and of use in the development of application packages. The potential savings of a real effort to locate usable computer programs or parts of programs may be significant if existing computer programs are well documented.

This review will take place during detailed requirement definition and system design tasks of the system life cycle (set out below). Furthermore, current ADP operational systems maintained by BLM out of DSC, Oregon, Alaska and other State Offices will remain in operation until the application package(s) which replace, modify or include current programs have been accepted by the users and the package(s) implemented at appointed offices. At that time, the current systems which support bits and pieces of a Bureau activity will be phased out as the application package oriented system is phased in.

For systems which are in some stage of development, individual management decisions will be made to continue or postpone that development based on the following considerations:

- The relationship of the development effort to the Strategic Plan priorities.

- The extent to which there is established user reliance for products produced.

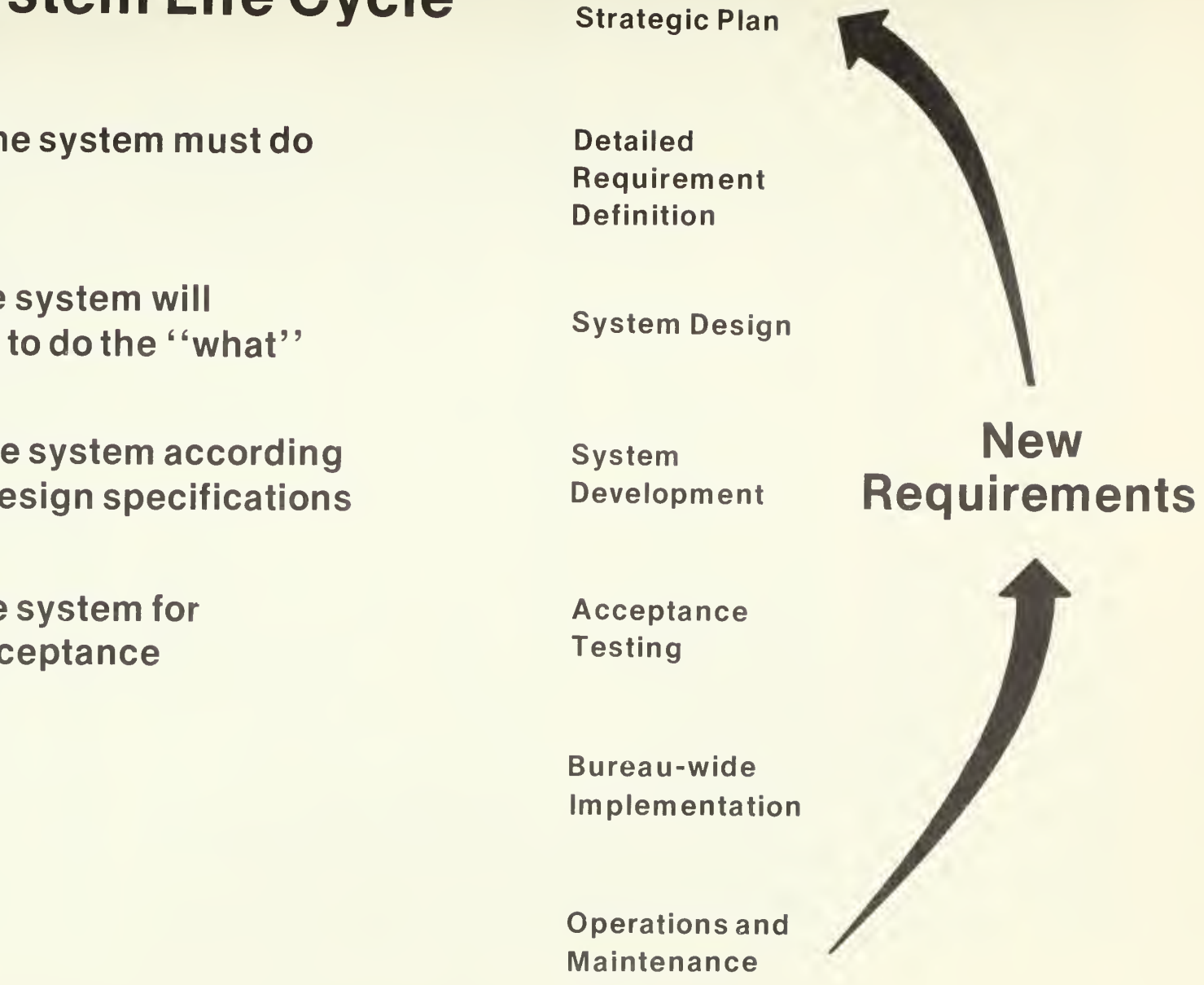
- Bureau priority and criticality for the products to be produced.

NECESSARY IMPLEMENTATION TASKS

Implementation of the Strategic Plan requires that a great many tasks be carried out (e.g., necessary training, hardware procurement, development of application packages, checkpoints for management approvals and personnel realignments during the early stages of plan implementation).

Figure 6.

System Life Cycle



It is essential that these tasks be carefully planned and scheduled in a sequence already proven in long range planning efforts of other institutions.

System Life Cycle Tasks

The multitude of tasks to be performed are grouped into a series of sequential steps, called the "System Life Cycle," and shown in Figure 6. By dividing the System Life Cycle into these seven sequential building blocks, and including adequate management review points throughout the cycle, both the user and data processor are able to check development and assure progress.

Primary and secondary responsibilities for these building blocks clearly indicate that activity within the System Life Cycle is shared between user and data processing staff with the user bearing the greater part of the responsibility.

Figure 7: SYSTEM LIFE CYCLE RESPONSIBILITIES

System Life Cycle Task	Responsibility	
	Primary	Secondary
1. Strategic Plan	User	DP Staff
2. Detailed Requirement Definition	User	DP Staff
3. System Design	equal	
4. System Development	DP Staff	User
5. Acceptance Testing	User	DP Staff
6. Bureau-wide Implementation	User	DP Staff
7. Operation and Maintenance	User	DP Staff

It is critical that BLM go through this sequence of steps for the Strategic Plan to be successfully implemented.

The six steps beginning with the Detailed Requirement Definition are discussed in detail below. This Strategic Plan documentation is, of course, the result of the first step.)

Detailed Requirement Definition

A detailed requirement definition (DRD) is a document specifying exactly what the computer system must do. It must clearly identify all interfaces with the computer. For people receiving output from the system the detailed

requirement definition must describe the output content and format and the means for requesting each specific output. For the people submitting input to the system, the detailed requirement definition must describe the input content and format plus the means of entering the data. Besides personnel interfaces, the detailed requirement definition must specify:

- A certain data base.
- System performance requirements.
- Data volume detail.
- Data frequency detail.

Throughout this effort, the data element serves as the common link among inputs, outputs and data base. The detailed requirement definition document serves as an input to the system designers. More importantly, it is the bridge between system users (marine biologist, forester, realty specialist) and technical system designers.

The four DRD efforts are currently planned as follows:

- DRD Phase 1:
  - Resource Inventory
  - Unit Resource Analysis
- DRD Phase 2:
  - Land Records
  - Case Management
  - Utilization Management
- DRD Phase 3:
  - Planning - MFP
  - EAR/EIS Preparation and Publication
  - Program Planning
  - Regional Analysis

- DRD Phase 4:

  AWP and Program Management

  Property Control and Management

  Manpower and Organization Management

  Accounting and Fund Control

  Payroll

  Protection

Computer System Design

Detailed requirement definition is followed by system design which uses the DRD as the what-the-system-must-do and proceeds to define how the system must be built to achieve the what in the most economical way. This requires breaking the DRD down into a series of logical processing segments and detailing and documenting those segments. The number of segments and the inputs, processes and outputs of each will depend on such factors as:

- The capacity of the particular hardware configuration (amount of core storage, number of disk and/or tape units available, etc.).
- Natural ADP processing segments covering such areas as input conversions, editing, sorting, merging, file updating, data base management, etc.
- Volume of transactions.
- Data base organization.
- Necessary audit trails and control provisions.

These are only some of the factors to be considered; the sequence and processes of the various processing segments often have to be modified and refined until the final systems design is completed.

Systems Development

System design documents are handed over to computer programmers for system development. This part of the system life cycle is where the processing segments are transformed into computer programs which have been coded, debugged, tested individually and as they interact and depend on each other.

Acceptance Testing and Bureau-Wide Implementation

Once the computer programs have been debugged to the professional satisfaction of the technical systems and programming personnel, they must then be debugged to the professional satisfaction of the end-users. This is called acceptance testing.

Acceptance testing is the period of time required for the users (or user representatives) to agree that the system satisfies their requirements. The goal here is to obtain user sign-off so that the system can be considered operational. This task is similar to a pilot study. Once the pilot study has been given Bureau approval, a Bureau-wide system implementation schedule can begin. Implementation and the length of time for it are management decisions.

Operations and Maintenance

Once an application is successfully phased in, it does not follow that it will remain unchanged. Experience has shown the need for and value of making periodic computer program changes. Some of the more common reasons are:

- Need for additional output information.
- Desire for change in input or output formats.
- New or obsolete policies, directives.
- Changes in ADP or remote sensing state-of-the-art.
- Desire to increase the scope of an application.
- Realization that computer program results or input requirements are not acceptable.

Some of the other important jobs in maintenance include keeping documentation current, keeping data processing schedules, and operating the computer facility.

Management Checkpoints

Checkpoints for management review are critical. Portions of the plan implemented to date must be reviewed in order to assure management that objectives are being met. Future schedules are developed and reviewed to obtain necessary approvals to continue.

LONG RANGE SCHEDULE OF TASKS BASED UPON SYSTEM LIFE CYCLE

The Long Range Schedule of Tasks are presented in a modified GANTT format in Figures 8-11. The Long Range Schedule of Tasks is divided into four phases in accordance with those established in the discussion on DRD (pages 33-34). Each of the four phases is consistent with the System Life Cycle Tasks concept (excluding the development of the Strategic Plan which is already accomplished). Phase I also contains certain one-time activities which may not be repeated in the other phases including:

- Equipment Procurement Tasks.
- Personnel and (re-) Organizational Activities.
- Initial Strategic Plan Briefing and Training Activities.

Phase I includes the one-time tasks mentioned above and tasks associated with the Systems Life Cycle Tasks needed to implement the Resource Inventory and URA packages.

Depending on available Bureau resources and management decision (not required until a review of Phase I progress assures management that commitment should continue), Phase II may be initiated. This phase includes tasks associated with System Life Cycle Tasks needed to implement Land Records, Case Management and Utilization Management application packages.

The initiation of Phase III depends on the same factors as Phase II and includes System Life Cycle tasks for MFP, EAR/EIS preparation and Publication, Program Planning and Regional Analysis application packages.

Likewise, the initiation of Phase IV depends on those same factors and it includes System Life Cycle tasks for AWP and Program Management, Property Control and Management, Manpower and Organization Management, Accounting and Fund Control, Payroll and Protection application packages.

This long range schedule of tasks is somewhat flexible. Certain of the tasks could be deleted without major impact to the Strategic Plan. Certain of the tasks could be replaced with an alternative that could bring full Strategic Plan implementation sooner or stretch it out so that costs are lower per year. Certain of the tasks could be moved to another position in the schedule given changes in Bureau program priorities.

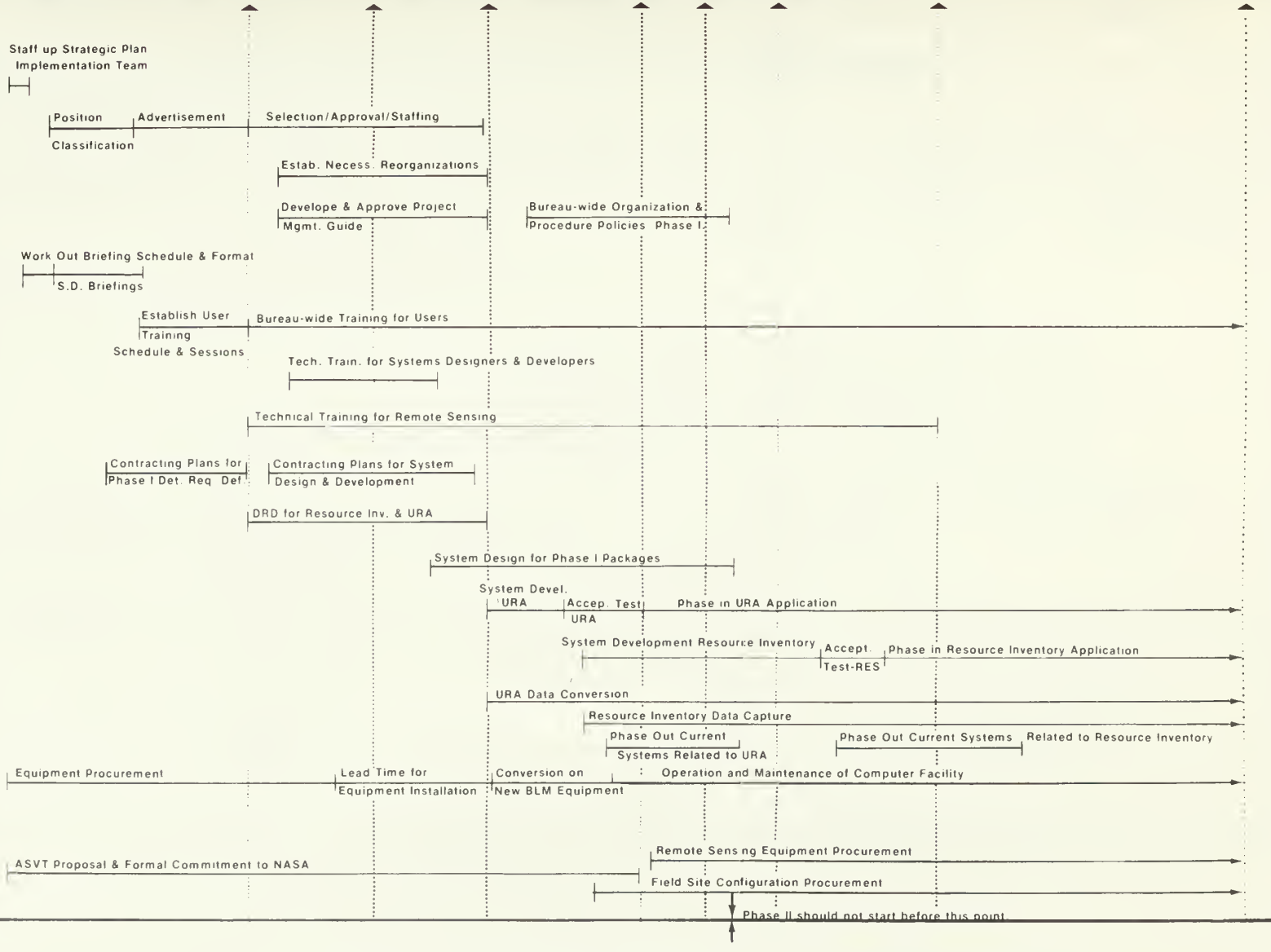
This 4-phased approach reflects the priorities established by the Steering Committee after weighing the BLM/IBM study recommendations and obtaining a sample of Bureau-wide opinion. The tasks and costs are as projected in 1975 and are subject to refinement as the effort proceeds.

Figure 8

PHASE I.

Management Checkpoint

Tasks Necessary to Implement Resource Inventory and U.R.A.

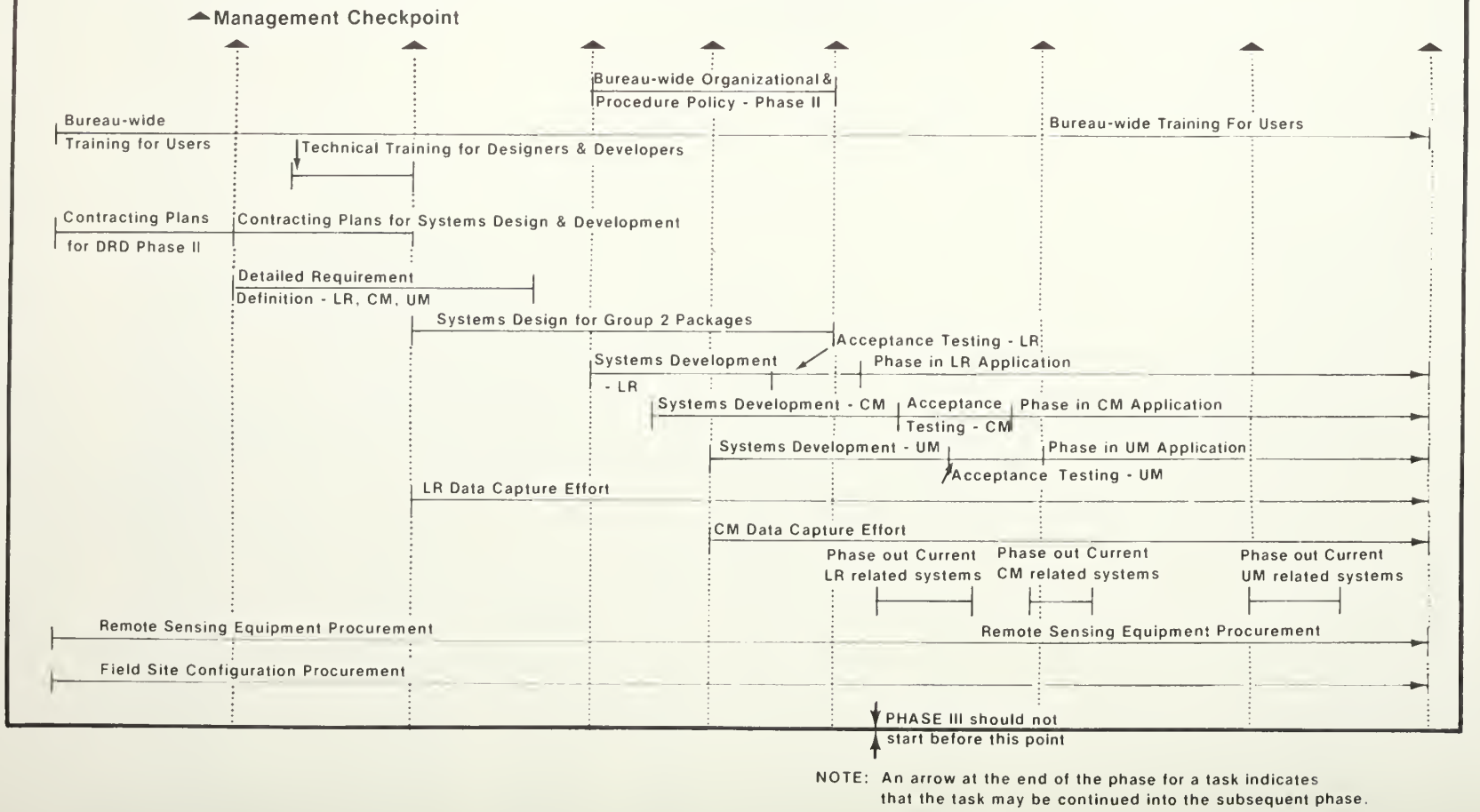

Staff up Strategic Plan Implementation Team
Position Classification
Advertisement
Selection/Approval/Staffing
Estab. Necess. Reorganizations
Develope & Approve Project Mgmt. Guide
Bureau-wide Organization & Procedure Policies Phase I
Work Out Briefing Schedule & Format
S.D. Briefings
Establish User Training Schedule & Sessions
Bureau-wide Training for Users
Tech. Train. for Systems Designers & Developers
Technical Training for Remote Sensing
Contracting Plans for Phase I Det. Req Def
Contracting Plans for System Design & Development
DRD for Resource Inv. & URA
System Design for Phase I Packages
System Devel. URA
Accep. Test URA
Phase in URA Application
System Development Resource Inventory
Accept. Test-RES
Phase in Resource Inventory Application
URA Data Conversion
Resource Inventory Data Capture
Phase Out Current Systems Related to URA
Phase Out Current Systems Related to Resource Inventory
Equipment Procurement
Lead Time for Equipment Installation
Conversion on New BLM Equipment
Operation and Maintenance of Computer Facility
Remote Sens ng Equipment Procurement
ASVT Proposal & Formal Commitment to NASA
Field Site Configuration Procurement
Phase II should not start before this point.

NOTE: An arrow at the end of the phase for a task indicates that the task may be continued into the subsequent phase(s).

Figure 9

PHASE II

Tasks necessary to implement Land Records, Case Management and Utilization Management


Management Checkpoint
Bureau-wide Organizational & Procedure Policy - Phase II
Bureau-wide Training for Users
Technical Training for Designers & Developers
Bureau-wide Training For Users
Contracting Plans for DRD Phase II
Contracting Plans for Systems Design & Development
Detailed Requirement Definition - LR, CM, UM
Systems Design for Group 2 Packages
Acceptance Testing - LR
Systems Development - LR
Phase in LR Application
Systems Development - CM
Acceptance Testing - CM
Phase in CM Application
Systems Development - UM
Acceptance Testing - UM
Phase in UM Application
LR Data Capture Effort
CM Data Capture Effort
Phase out Current LR related systems
Phase out Current CM related systems
Phase out Current UM related systems
Remote Sensing Equipment Procurement
Remote Sensing Equipment Procurement
Field Site Configuration Procurement
PHASE III should not start before this point

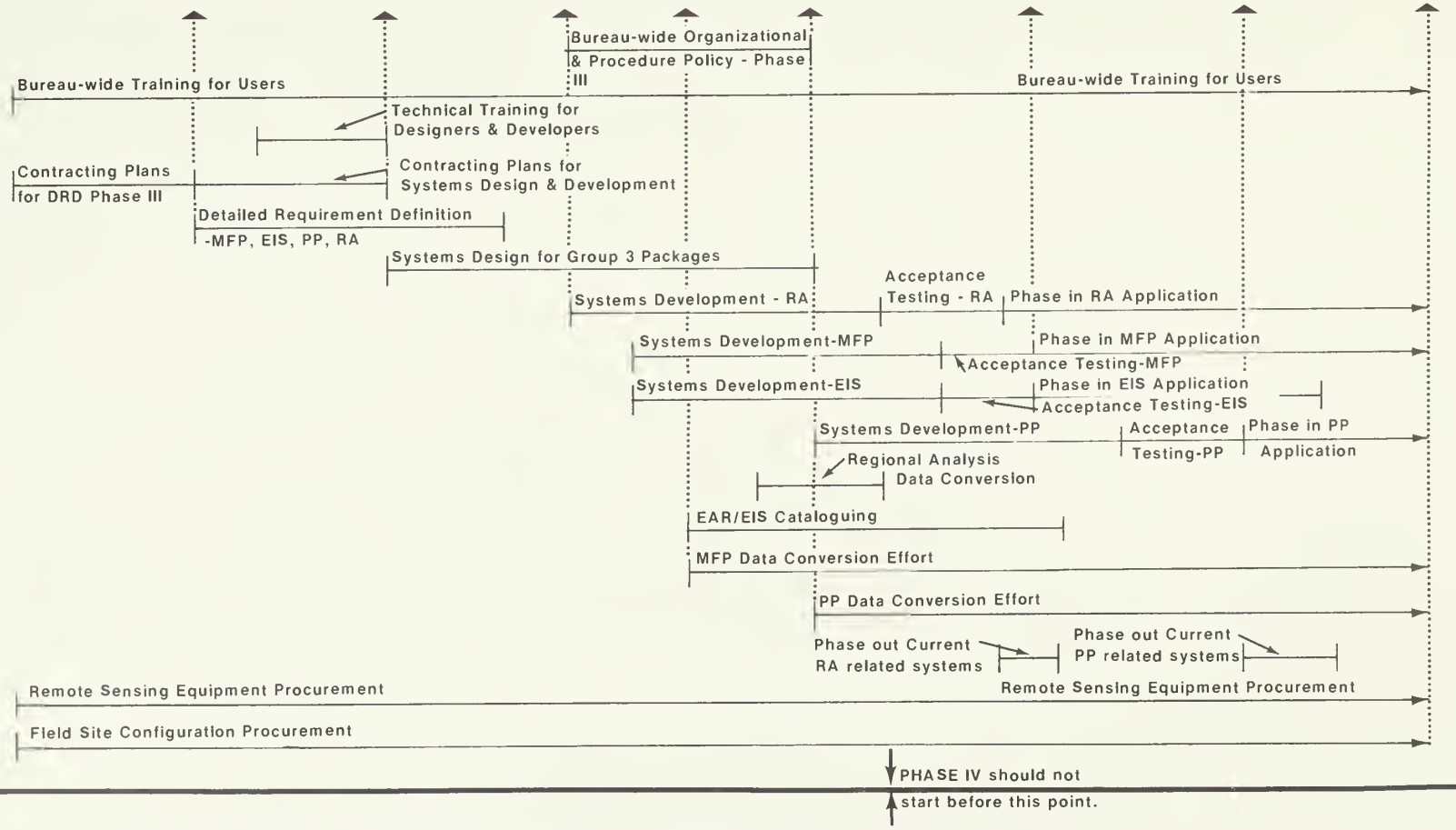
NOTE: An arrow at the end of the phase for a task indicates that the task may be continued into the subsequent phase.

PHASE III

Figure 10

Tasks necessary to implement MFP, EAR and EIS, Program Planning and Regional Analysis

▲ Management Checkpoint

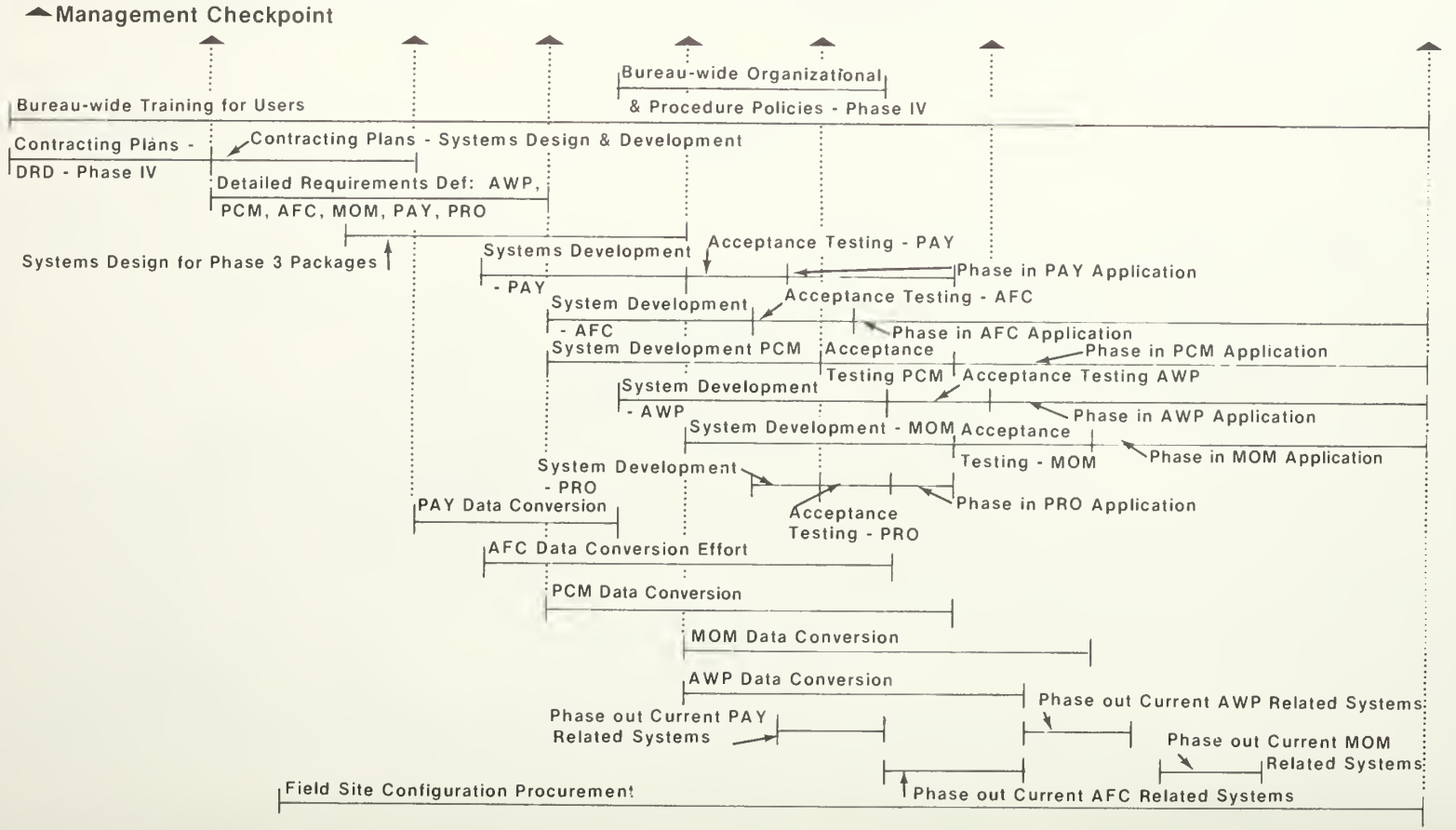


NOTE: An arrow at the end of the phase for a task indicates that the task may be continued into the subsequent phase.

PHASE IV

Figure 11

Tasks necessary to implement AWP and Program Management, Property Control, Accounting and Fund Control, Manpower Organization & Management, Payroll and Protection



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